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Sustainability Profile for Urban Districts in Copenhagen

Paper for 'Sustainable Cities and Regions: Enabling Vision or Empty Talk?', Örebro University, Sweden, March 11-13 2009

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Keywords
Sustainability profile, urban districts, tool, DPL, data, sustainability assessment

Abstract
The paper concerns the development of sustainability profiles for districts in Copenhagen. This work is currently being carried out by the Danish Building Research Institute, the Technical University of Copenhagen, and the municipality of Copenhagen. The aim of the project is to develop a first model for sustainability profiles for districts in Copenhagen that includes environmental, social and environmental indicators. The work is strongly inspired by the Dutch model 'DPL' (Dutch acronym for Duurzaamheid Prestatie voor een Locatie, 'Sustainability-Profile for Districts'), which has been quite successful in the Netherlands. The developer of DPL, IVAM Environmental Research, is consultant for the project.

The concept of DPL is that the tool "*.. assesses in a clear and transparent way the spatial plan for a district on sustainability, based on the information from the urban plan. It so helps urban designers to creatively improve the sustainable performance of a district*" (Kortman et al, 2001). Compared to other tools for assessing urban sustainability, DPL represents a simple and flexible approach. The idea is to use a limited number of indicators based on already collected data. Once the data-collection has been completed, it is easy to repeat it, hence enabling a continuous monitoring of the district. The flexibility of DPL is that it accepts the use of alternative data if the requested data are not available, and also allows new indicators to be included, if they are of special interest of the municipality. This allows a DPL-assessment to be carried out rather smoothly, and thus increase the use amongst municipalities. The DPL-assessment does not provide any 'scientific' correctness, but must be seen as a model open for interpretations and discussions of the local sustainability.

Applying the model on urban districts in Copenhagen has implied some changes of indicators. This has, however, also enabled an elaboration of profiles for all 10 districts in Copenhagen, an instant benchmarking between the districts, and comparative analysis of the indicators.

The paper will discuss and argue for the choice of model in relation to general experiences on using tools for assessment of urban sustainability, and describe the chosen indicators. The experiences and results derived from the profiles so far will be discussed, as well as strengths, weaknesses and possible improvements of the model. Finally, potential uses of the tool will be considered in relation to ongoing projects and planning initiatives in Copenhagen.

Introduction
This paper describes a tool for assessing the sustainability of different urban districts in Copenhagen, in terms of 'sustainability profiles' for each district, which has been developed on the basis of the Dutch DPL-tool.

Many municipalities have developed and launched various indicator systems to monitor sustainable development on a city level (see Devuyst et al., 2001 for several examples). On the level of urban districts, methods and initiatives are fewer. Different types of models and approaches to assess and measure urban sustainable developed on a local level include a wide array from models like the British 'BRE Sustainability Checklist for Developments' or the US assessment method Smart Scorecard (Fleissig & Jacobsen, 2002), which are mainly used for planners to assess and improve new urban developments, to bottom-up models, where indicators and concepts for urban areas are developed by local actors in collaboration with planners or scientists. The DPL-Copenhagen tool can be seen as somewhere in between these approaches, as a top-down tool to hopefully generate a bottom-up process. It is the aim that the model should be used by the municipality to create dialogue and debate with citizens, businesses and environmental organizations on

how efforts should be prioritized and organized. Also, the model could be used to stimulate the political debate on sustainable urban development in the municipality. The main purpose of the tool is to quantify environmental, social and economic sustainability for an urban district (figure 1), based on the selection of few central and easy accessible indicators.

There are various reasons for developing a tool to assess sustainability of urban districts:

- Urban districts are different, also in Copenhagen. Sustainability indicators closer to the citizens are needed to better understand the sustainability in context. The urban scale for cities like Copenhagen (500.000 inhabitants) is too large to use only one green account a municipal level.
- The municipality could differentiate and target its politics on sustainability in relation to the various characteristics of the districts
- Many environmental and social initiatives are taking place on a local scale, including area-based urban renewal and Agenda-21 activities (each district in Copenhagen has its own Agenda 21-center). For these purposes a quantification and visualisation of the local sustainability is useful. Although the quantification is to a large extent subjective and constructed (through the choice and weighting of indicators), it is a way to manage sustainable issues in a practical way, and avoid that sustainability just becomes 'empty talk' and fluffy visions.

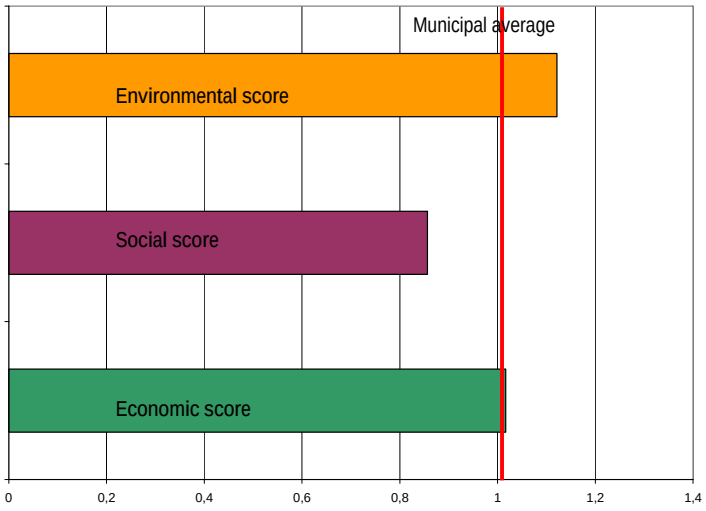

Figure 1.The principal aim for the DPL-Copenhagen model to measure sustainability on local level

The DPL-Copenhagen tool exists now in a preliminary version. The paper will describe the concept of the tool, the profiles and discuss possible uses of the profiles.

Background

Theoretical perspectives

Urban sustainability is becoming an increasingly important element in the policies for European cities, and as a consequence a large number of different tools are being developed by researchers, consultants, ngo's, national and international bodies (Devuyst, 2001; Jensen and Elle, 2007). From a theoretical point of view it is relevant to ask why we need tools to assess sustainable development, and what we might use the tools for. Current theories in the field of Ecological Modernisation, Governance and New Public Management offer social and institutional explanations for this development. From these theories we can outline different purposes for the tools:

Making environmental issues calculable and integrating sustainability into politics: An important feature of sustainability assessment tools is about making environmental issues calculable – "what gets measured gets managed". Assessment tools ideally focus on how substance flows could be better managed and controlled, integrating both technical and social aspects. Instruments as LCAs and environmental performance indicators are examples of this modernisation-process (Spaargaren 2000). The large focus on indicators, benchmarks and quantitative goals is a way to make sustainable development manageable for the existing political and administrative systems. The integration of sustainable qualities into existing institutions demands transformation into manageable entities, making sustainability a possible object for defining measurable goals, quotas, norms and green taxes (Van Tatenhove & Leroy 2003; Elle et al. 2003). It both represents an 'ecological modernisation' of the public institutions, as well as the new conditions that sustainable development has to adhere to. We can see the 'tool-ification' and 'normalisation' of sustainability as dominant trends in sustainable urban development; sustainability is increasingly being defined through

the tools and standards used, and increasingly being integrated in the production scheme of “traditional” policy.

Managing new actor relations: Ecological Modernisation suggests, along with theories on Governance and on New Public Management that new institutional arrangements are emerging. In traditional politics, challenges as to sustainable development would have been met with increasing regulation and new laws. For several reasons, this model is not valid any more. Instead, challenges are increasingly met through the authorities’ collaboration with the civil society as well as the market. Authorities increasingly pursue its policy through voluntary agreements and partnerships, but for this use a number of voluntary 'rules' has to be invented that the partnerships can accept (Boström, 2003). The implementation of tools and Environmental Management Systems can be viewed as communication tools, both internally within the organization and to communicate with actors outside the municipality (von Malmborg, 2003). Methods for defining and quantifying sustainability therefore become parts of defining local 'story lines' and 'discourse coalitions' (Hajer, 1998).

From these theoretical perspectives we can argue that the reasons for developing assessment tools and methods for urban sustainability is not only related to a ‘commons sense’ understanding of measuring and mapping sustainability issues, but is also embedded in new types of policies based on voluntary stakeholder involvement and collaboration, calls for sustainability policies to be evaluated etc.

Experiences from practical use of tools

From the studies carried out in the PETUS project (Practical Evaluation Tools for Urban Sustainability, www.petus.eu.com) on how sustainable assessment tools are used in different European cities, it is however clear that the practical world does not always follow the theoretical expectations (Jensen & Elle, 2007). One of the main conclusions from the PETUS studies is that assessment tools are mainly used in projects already defined as sustainable. In almost all cases we studied where tools were used, the project or policy was already declared sustainable, meaning that a number of sustainability initiatives had already bee decided. Applying the tool in these projects therefore had limited influence of increasing the sustainability of the project, but could instead be seen as a part of the ‘green branding of the project. This makes it difficult to assess the tools’ actual influence on the project and questions the role of the tool: is the tool used to improve the sustainability, or is it a way to say that the project is sustainable? Ideally, tools for sustainability should be applied to any project, and by using the tools, the projects and policies should become more sustainable. This is the logic behind the EIA- and SEA-procedures, which are used on all project of a certain volume, but when it comes to the voluntary sustainability tools, most tends to be used where sustainability is already on the agenda.

Another central observations is that the tools are often being used few times, and tools and methods that are beings used on a regular basis are rare. In many cases it is a single actor who introduces and drives the use of a tool in a sustainability project. This might be actors that have an expertise or experience using a tool, or actors (individuals or institutions) that have developed a tool themselves. Typically, the tool is not an integrated part of the client's or municipality's practice, and that these persons are hired as external consultants to carry out a sustainability analysis. This means that learning about the tool, building competences and establishing an ownership to the tool is typically embedded at the consultant, and not at the client or the municipality, who therefore often sees the use of the tool as an extra cost.

Moreover, it is very often that predefined tools are strongly adapted to the context, and used only in parts. Such flexibility is generally a necessity (due to contextual differences, data access etc.), but may be a problem if the aim is to compare and benchmark different cases. However, the adaption of tools to certain projects and context's is a part of the learning process, and in many cases this leads to developing new versions of predefined tools, based on problems applying the existing tools on a specific case. There are several examples on users who have been working in a process of applying an existing tool on a specific case ends, and adapting it to the specific context, ends up defining a new tool (or new versions of the existing tool) based in this experience. This illustrates that to some extent, to become a skilled user of a tool and feel ownership to it, you have to develop the tool yourself. At least, when looking at examples from successful uses of tools, this is a near conclusion.

A main reason for the very flexible and adaptive use of tools is related to data problems: Generally data on sustainability are limited, and in some cases not accessible – or too expensive to collect. As many tools require a large number of data, the practical use necessarily has to be flexible. The often encountered problem of data accessibility is also a reason for not using assessment tools, as the lack of data either makes the tools difficult or expensive to use, or has a limited basis for comparison. Other reasons amongst

potential users (municipal planners, departments, clients, building owners etc.) for not using tools relates to lack of knowledge of the tool or to a skeptic of the advantage or using the tool. Finally, many potential users think that the tools lack legitimacy, reliability and transparency

DPL in Copenhagen

The experiences and observations discussed above have strongly influenced our view on why the Dutch model DPL (Dutch acronym for Duurzaamheid Prestatie voor een Locatie, 'Sustainability-Profile for Districts') could be suitable to adapt to Copenhagen. The concept of DPL is that the tool "*.. assesses in a clear and transparent way the spatial plan for a district on sustainability, based on the information from the urban plan. It so helps urban designers to creatively improve the sustainable performance of a district*" (Kortman et al, 2001). Compared to other tools for assessing urban sustainability, DPL represents a relative simple and flexible approach. The idea is to use a limited number of indicators based on already collected data, which are often accessible in the municipal registers. From these data, environmental, social and economic profiles for the district are calculated. If data are not available, the model allows alternative methods for a 'best estimate' on the indicator. It also allows new indicators to be included, if they are of special interest of the municipality. These features make DPL flexible for the users, but also allows for a broader interpretation of what should be included in 'sustainable districts'.

Once the data-collection has been completed, it is easy to repeat it, hence enabling a continuous monitoring of the district. This allows a DPL-assessment to be carried out rather smoothly and thus possible increase the use amongst municipalities. The DPL-assessment does not provide any 'scientific' correctness, but must be seen as a model open for interpretations and discussions of the local sustainability. The DPL-tool represents a step away from the scientifically based models, aiming at a objectively 'correct' answer to the question of sustainability, towards a more open, pragmatic and flexible approach, where the aim is to communicate and discuss sustainability at a local level, more than delivering one correct answer. From a long record of sustainability assessments of different types of districts, the Dutch DPL-tool provides sustainability benchmarks within certain types of urban districts (high-rise, mixed areas, low-dense etc.), and thereby making the sustainability comparison and benchmarking more relevant for the actual area being assessed.

Due to the apparent success in the Netherlands and the concept of DPL that avoids many pitfalls of the existing tools for assessing sustainability, it was decided to test and 'translate' the DPL-tool to a Danish context. The work of developing a model for sustainability assessment of urban districts in Copenhagen began with a wish to test and transfer the DPL tool to Copenhagen. This work was carried out in collaboration between the Danish Building Research Institute, the department for Environmental Protection in the municipality of Copenhagen, IVAM Environmental Research (developers of DPL) and the Technical university of Denmark, and financially supported by the Fund for Urban Ecology in Copenhagen. The project included 1. A test of the DPL–model on two districts in Copenhagen, 2. An adaptation of the indicators to the context of Copenhagen, 3. Testing the adapted model in selected areas, with comments from local users.

Choice of indicators

First step was to examine the data availability in Copenhagen for the indicators used in the DPL model. It turned out to be very difficult to provide the necessary data and carry out a test of DPL. Therefore it was decided to moderate the choice of indicators, so that data for all indicators would be available for the districts in Copenhagen, and so that the data were all considered relevant by the project partners. Therefore, some differences exist between the indicators used in the original DPL and the ones used in the DPL-Copenhagen model. The indicators were in some cases changed due to lack of data and lack of relevance (or both). For instance, it was decided not to include the indicators 'odour' and 'internet access' due to lack of relevance, compared to other issues. Other indicators were regarded highly relevant, for instance 'waste collection, 'air pollution' and 'traffic security' – however, in Copenhagen, data for these issues are not available on a district level. Finally, we decided to add other indicators which were not included in the DPL-model, which our data allowed us to do, for instance the directly measured energy consumption in different types of buildings (from a database on the Energy-labelling of buildings). The main parts of the data were available in the existing registers in the statistical office in Copenhagen, others were collected in the municipal administration, and others from websites.

	Original DPL-model	Adapted DPL-model for Copenhagen
basis data	Basis information: Inhabitants, number of dwellings, total surface, length of roads.	Basis information: Inhabitants, number of dwellings, total surface etc.
Environmental indicators	1 and 2: Materials and energy 3. Areal disposal 4. Rainwater treatment (deleted) 5. Soil pollution 6. Waste collection 7. Air pollution	*Housing* 1. Heat consumption per inhabitant (kWh / person) 2. Housing consumption pr. inhabitant (m2 / person) *Transport* 3. Car ownership per 1.000 inhabitants 4. Shared cars per 1.000 inhabitants 5. % of inhabitants working within city limits 6. Share of households with noise load (+ 68dB) *Companies and institutions* 7. Energy efficiency in shops and offices (kWh / m2) 8. % companies members of the Copenhagen Environmental Network *Citizens* 9. Share of population registered as 'Climate citizens', an internet-based forum for commitments to private climate initiatives
Social indicators	8. Noise pollution 9. Odour pollution 10. Social security 11. Traffic security 12. Industrial health threads 13. Quality of public service 14. Access to public transport 15. Public parks and gardens 16. Water 17. Urban quality 18. Residential quality (deleted) 19. Social cohesion	*Urban qualities* 10. Facilities for restaurants, hotels and culture (m2) 11. Facilities for sports (m2) 12. Recreational areas (green and blue) *Housing* 13. % affordable housing (< 5.000 DKr. (800 €) in rent per month) 14. % dwellings with installation needs *Social qualities* 15. Mixed housing ownership in the district 16. Unemployment rate amongst workforce
Economic indicators	20. Local workplaces 21. Type of local companies 22. Sustainable companies 23. Mix of functions in the area 24. Flexibility in the area 25. IT infrastructure in the area	17. Average household income 18. Education level amongst citizens 19. Number of workplaces per citizen 20. Prices on houses and flats (sales-prices per. m2)

Table 1. The original indicators in the DPL-model, and the indicators selected for the adapted DPL-Copenhagen model.

Different types of indicators

The adapted DPL-model for Copenhagen includes a differentiation of the indicators. While some indicators can be seen as positive urban qualities, including social and economic objectives that create progress and momentum in the city, other indicators describe the environmental status on selected topics (energy consumption, transport, etc.). Finally, other indicators describe the potential for change as counter-action to the negative environmental consequences, such as environmental certification of companies, Agenda 21 actions, or to register as climate citizens. This breakdown is based on the DSR methodology (Driving forces, State and Response), developed by the OECD in 1993 (OECD, 1993). Figure 2 illustrates examples on how the DSR-principle could be used to describe different types of indicators in an urban context urban include

various types of indicators in the DPL-Copenhagen model, to illustrate the different meanings they have for urban sustainability, and to generate ideas on how indicators might influence each other.

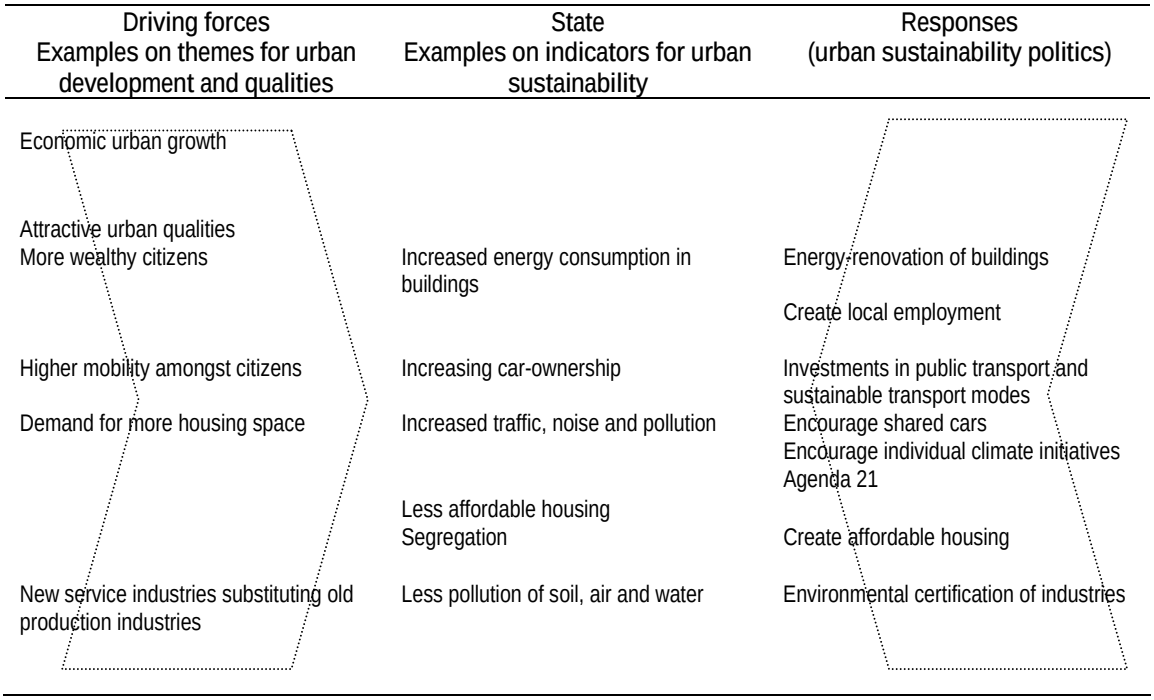

Figure 2. A differentiation between indicators: Examples on driving forces, state and responses in relation to sustainable urban development.

Weighting and calculation of values

The DPL-Copenhagen assessment of urban districts' sustainability is relative, i.e. the districts are only assessed in relation to the city on average. In the model all indicators are turned into indexes, where a score on for instance 1,2 means that the indicator scores 20% better than Copenhagen in average. The index-calculation in our opinion makes the numbers in the model more transparent than a model where each score is calculated. The disadvantage with this method is it can be difficult to manage large variations between the districts, especially when a high number for an indicator has to be transformed to a low score – or the reverse, a low number has to be transformed to a high score. It also means that a low score might not be very sustainable on an absolute measure (for instance measuring the ecological footprint of the district), or even compared to districts in other municipalities. However, it might be possible also to include absolute measures on sustainability in the profiles, for instance calculation of the ecological space or the ecological footprint for the districts.

Presentation of the sustainability profiles

Copenhagen holds app. 500.000 inhabitants and is divided in 10 urban districts (figure 3). The districts vary between 36.000 and 71.000 inhabitants and from 380 ha in space for the smallest (Nørrebro) to 1900 hectares for the largest (Amager Vest).

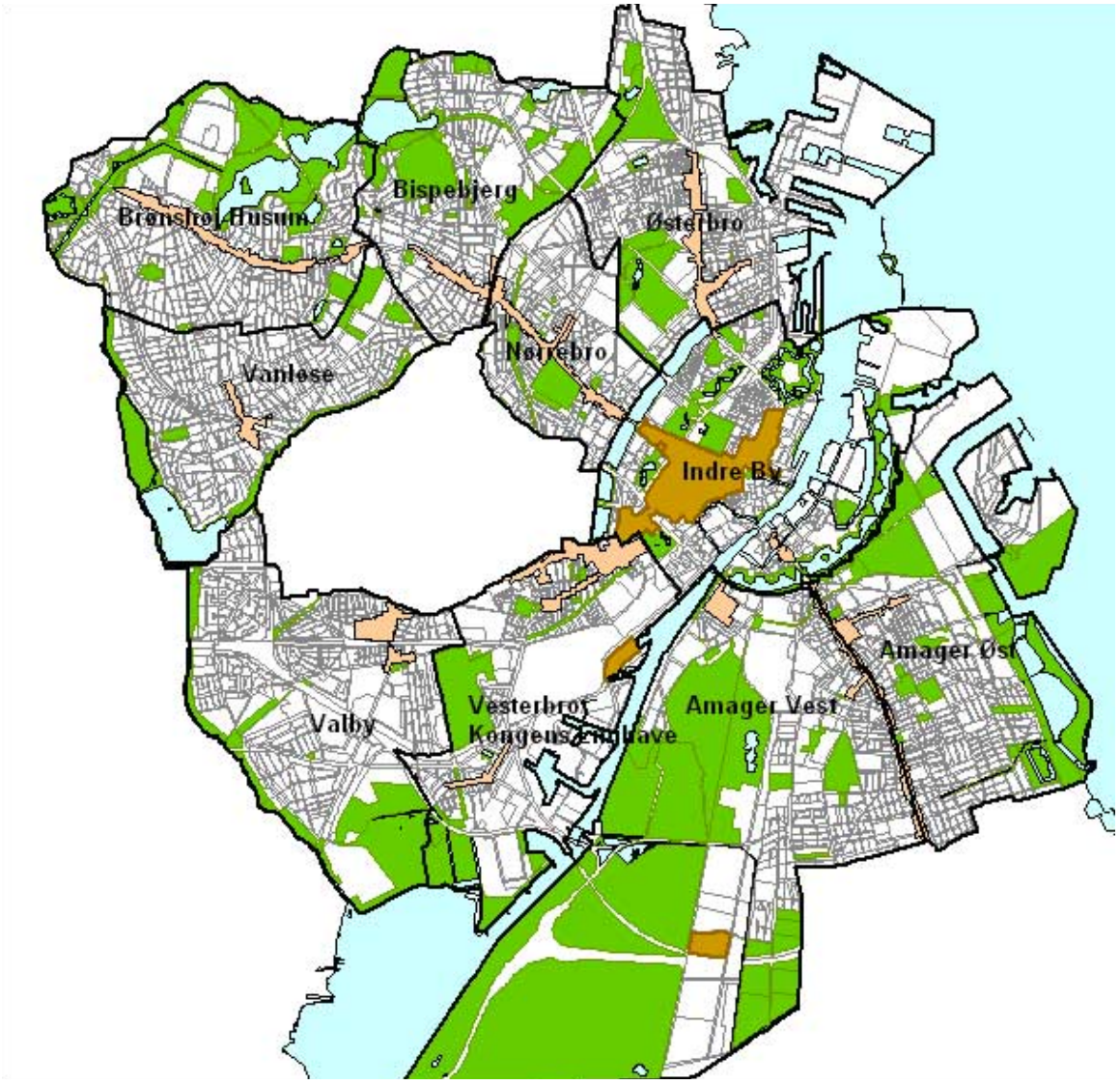

Figure 3. Map of the 10 districts in the Municipality of Copenhagen (the white area in the middle is the municipality of Frederiksberg).

Figure 4 shows the result of calculating the environmental profiles for the ten districts in Copenhagen. Correspondingly, social and economic profiles for the districts have been developed (see appendix 1). The following will however mainly focus on the environmental profiles, and a first interpretation of the profiles in relation to the different characteristics of the districts.

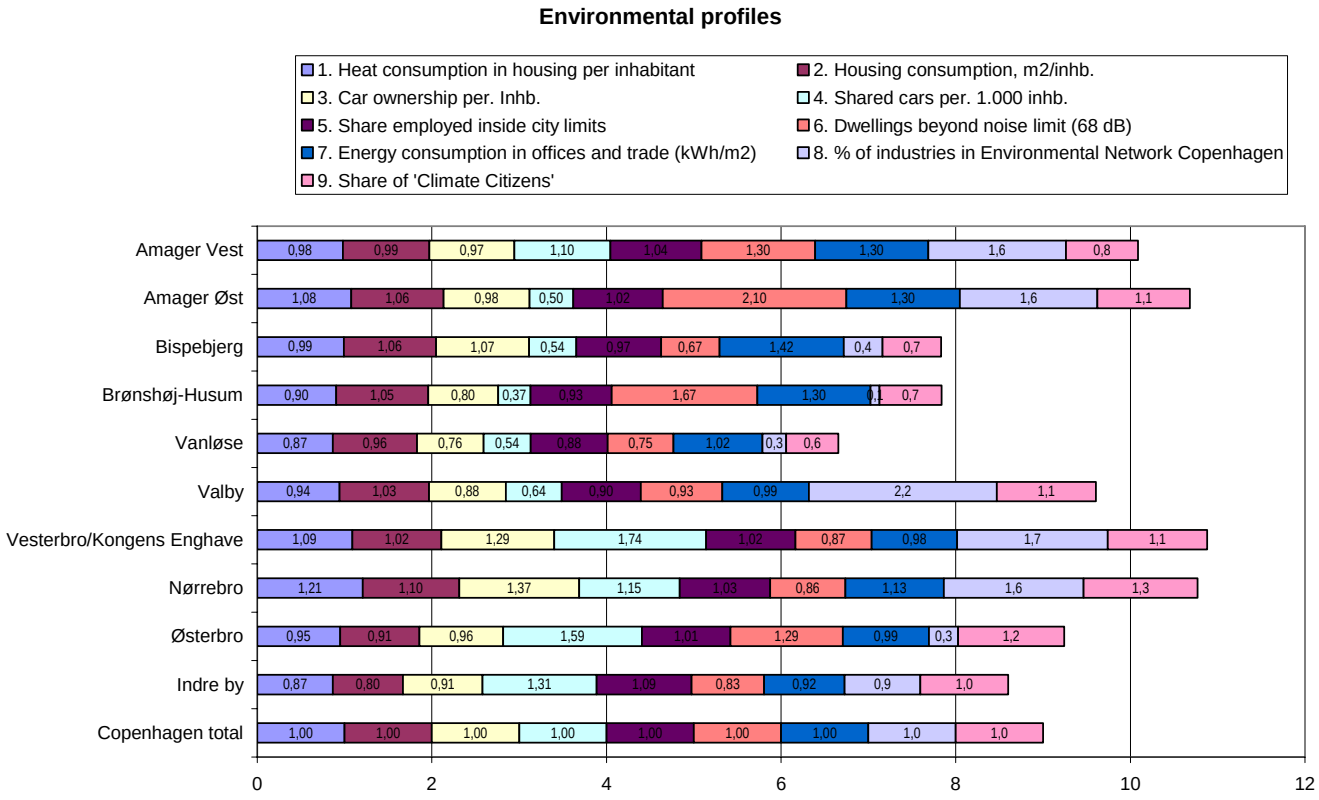

Figure 4. Environmental profiles for the ten districts in Copenhagen. The higher score, the better environmental performance compared to the city average, and vice versa.

The profiles indicate that there are large differences between the sustainability of the ten districts. The overall scores, with 9 as reference for the city average, ranges from around seven as the lowest (Vanløse) to eleven as the highest (Vesterbro/Kgs. Enghave). Moreover, we see that the districts that have an overall high score, scores high on most of the indicators (and not just one or two). The districts with the overall highest scores, Nørrebro and Vesterbro/Kongens Enghave have high scores on most indicators, and only falls beyond city average on number of dwellings with noise problems (indicator 6) and partly in energy efficiency for officers and shops (indicator 7). This suggests that there might be some structural connections between the type of district and the environmental score. The districts with the highest scores (Amager Øst, Nørrebro, Vesterbro/Kongens Enghave) are all dominated by multi-storey-buildings, built around 1850-1900, for the working class in the emerging industrial city. Today, these areas are to a large degree occupied by younger people, students and low-income groups, especially for Nørrebro and Vesterbro. The indicators show that the housing consumption is low (gives a high environmental score), the heating consumption per inhabitant is low, the car ownership is low, and at the same time the action-orientated environmental indicators (numbers of 'Climate citizens', shared cars and companies joined the environmental network of Copenhagen) are all high.

The districts with the lowest environmental scores (Vanløse, Brønshøj-Husum and Bispebjerg) were all included in the Municipality around 1900 to absorb the expanding population from the rest of the city, and they were subsequently planned and built with mainly social housing estates and single-family houses. The environmental performance of these districts generally have the opposite situation than the highest-scoring districts: The consumption of heat and housing space per inhabitant is generally high, so is the car-ownership, as well as the proportion of people working inside the city limits (indicating longer commuting distances). At the same time, they score low on all of the action-oriented indicators.

The low-scoring and high-scoring districts have in common that there is an apparent connection between the indicators on 'environmental state' and on 'response' – low consumption corresponds to low action in the low-scoring district, and vice versa for the high-scoring. For other districts, however, the connection is apparently different. For instance, the district Østerbro scores generally low on the 'environmental state'-indicators (due to a high consumption of heating and housing space, as well as a high car-ownership) – but

scores high on the 'response'-indicators, 'shared cars' and 'climate citizens', which in the overall environmental score to some extent compensates for the negative effects of the consumption. For some districts certain local environmental initiatives influence the overall score. One example is the district Valby, where the local Agenda 21-center has focused their environmental initiatives on the local shops and industries, including attempts to make them members of the Copenhagen Green Network, a municipal-based network between 'green' industries. This effort is visible in the environmental score for Valby that has more than twice as many members amongst local industries than the average of Copenhagen, and therefore scores high on this indicator, although the other indicators are far from impressive.

Some of these characteristics correspond well to our prejudgement of the various districts: Nørrebro and Vesterbro are for the young and educated people with limited economic resources seeking urban experiences, whereas Østerbro is occupied by more well-off people with political correctness (the 'café latte - segment'). In the districts in the fringes of Copenhagen municipality there are many single-family houses and better access to green areas than in the rest of the city, which typically make the districts attractive for families with double income, who have the economic capacity to buy a house and to use cars for their daily transport etc.

Sustainability: Urban density or lifestyle?

From an analytical perspective it is tempting to compare the districts on various indicators. One example is the discussion on density and sustainability on an urban scale. In discussions and perceptions on the sustainable city, density is often regarded as a central parameter. However, recent research from consumption studies (Jensen, 2008; Gram-Hanssen, 2003) shows that life-style and related parameters such as income and the use of housing space are central parameters for consumption of energy. The question is, whether such parameters also corresponds the variations of a district level, or whether the urban density has a larger influence. For an initial test on this question we have taken the urban density for each district and compared to four indicators from our model: Heating consumption per resident, housing consumption per resident, car ownership per resident and household income (figure 5).

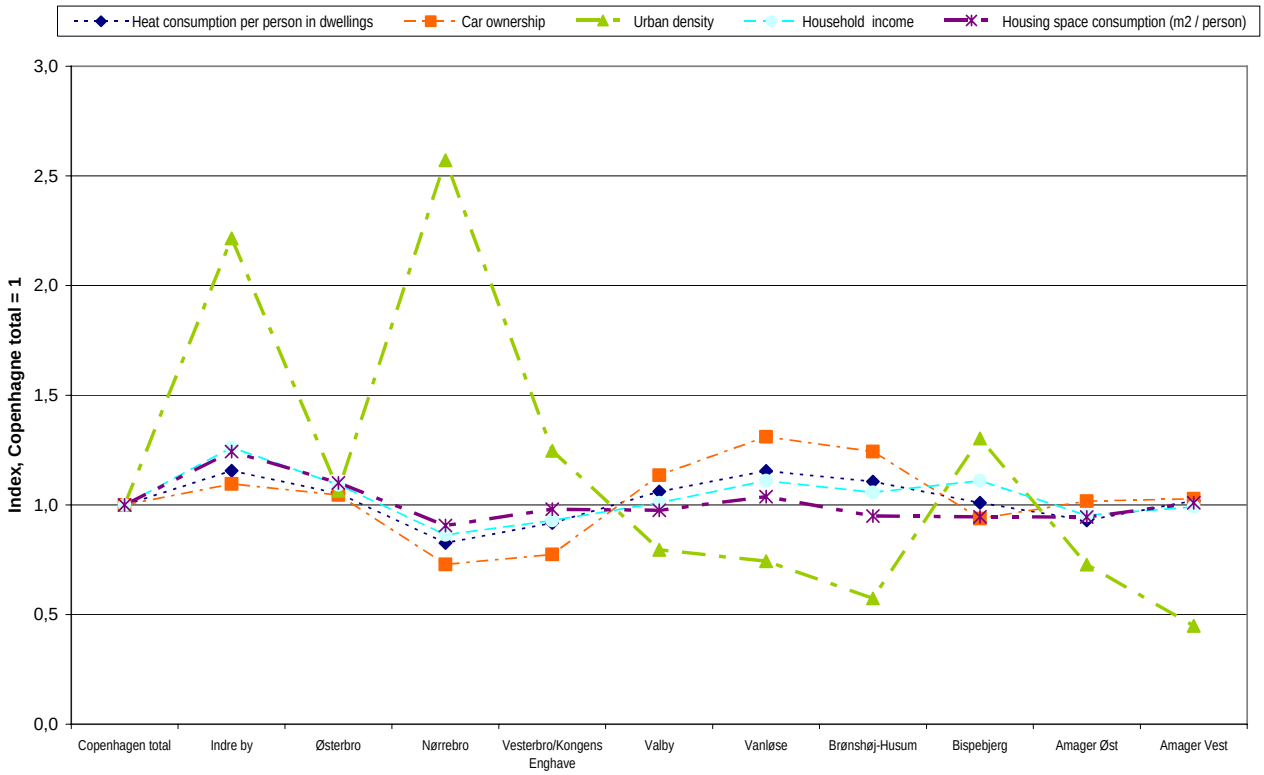

Figure 5. Index for urban density, heat consumption, car ownership and household income in the ten districts in Copenhagen.

As seen in the figure, there is – in line with the consumption studies – apparently a strong correlation between the districts on income, housing consumption, heating consumption and car ownership. The relation

to urban density is more ambiguous: For the districts with the highest densities, we would (due to better proximity to services and public transport, and less heat looses from houses) expect a higher sustainability, and less consumption. For some districts, this connection apparently holds – as argued before, the two former working-class districts Nørrebro and Vesterbro which are now dominated by low-income groups have high densities and low consumption scores, whereas districts with a more suburban character (Vanløse and Brønshøj-Husum) are low on density and high on consumption scores.

There are, however, exceptions. One example is the district 'Indre By ('Inner City'), which has the second-highest density, but has high consumption rates on housing, heating and car ownership; the heat consumption per. inhabitant is the largest in the municipality (app. 8000 kWh / person / year), so is the housing consumption (72 m2/person), which indicates a high consumption of electricity. In spite of the high density to all kinds of servicers and urban qualities (for instance, more than third of the workforce work on an address within the district), the car ownership is surprisingly high (194 per 1.000 inhabitants, or 10% more than for the city as average). Here, consumption dynamics, including a high household income, apparently overrules the sustainability qualities of the dense city, as this district is attractive for well-educated and high-income households. This raises the question whether developing sustainable and attractive districts is possible, if it attracts wealthy residents who want large houses, consumer electronics and cars, no matter the proximity of urban qualities.

Using the assessment tool in an urban regeneration process

Another way of using the sustainability profiles is in relation to area-based initiatives, as for instance urban regeneration. Here, the profiles might help to identify goals, discuss the identity of the area, and to spark discussions on means and goals for the regeneration process. For this purpose, the tool is currently being tested in three areas where urban area-based regeneration is taking place and where sustainability is highly prioritised (Sundholmsvej in Amager Vest, Gl. Valby in Valby and Albertslund Syd in the municipality of Albertslund).

A main challenge in this is the limited data access on the local level, combined with high ambitions to establish measurable goals and indicators for the urban regeneration; whereas social and economic measures are well-developed even on local scale, environmental data are more than scarce. Nevertheless, planners and administrators being responsible for the urban regeneration might be ambitious on formulating measurable goals for the renewal, to justify the sustainability efforts and the public investments. For instance, data on energy use in the districts' buildings is highly desired, but this can be very difficult to access, because the energy providers are not able or motivated to deliver the data, or because they have been privatised and have no public obligations. Also, the urban regeneration programme might not have the necessary financial resources to pay for the data. In the DPL-Copenhagen model we have used data from Energy Labelling of buildings, which include data for a number of buildings in the area and therefore gives an indication of the energy use for buildings in the area, but not an exact measure. As the planners might request documentation for the energy use, or CO2-emissions before and after the regeneration process, these data might not be regarded as being sufficient. As the energy use in building is determined by a number of other factors that the initiatives in the urban regeneration programme (for instance local demographic and economic changes), it might be very 'risky' to use reductions in energy consumption or CO2-emissions as goals for the regeneration, especially as the finances for building refurbishment are limited. Therefore, using the 'Driving Forces, State and Response'-distinction between indicators as discussed previously, we advocate for not solely using 'state'-oriented indicators, but urge the need to develop 'response'-orientated measures and indicators on a local level, that are more closely related to the actual influence of the urban regeneration.

Challenges and development

The presented version is the first attempt to develop a sustainability profile for the urban districts in Copenhagen. Therefore, the model can be improved in many ways.

- The choice of indicators could be improved: For instance there presently no indicators on access to public transport in the districts although we know that this is an important factor for the use of transport mode. Also, we know the car ownership, but not how much people actually drive in their cars. Finally, we would like data on cycle transport, which accounts for app. 1/3 of all transport in Copenhagen, and is an important political goal to develop as well.

- A module for calculating CO2-emissions on a local scale could possibly be developed, if input on transport could be improved, which also would mean that the energy infrastructure (production mode) would become visible
- Indicators on waste production and treatment should be included, but no data are available on district level at the moment
- The present districts with app. 50.000 inhabitants and 900 hectares are rather large areas, with large internal differences between neighbourhoods within the district. Therefore, applying the assessment on smaller districts or neighbourhoods would appeal more to a local identity.

It is also a challenge for the DPL-Copenhagen tool to be integrated and used in the municipal administration, and to get linked to other initiatives on sustainability currently being taken in the Municipality. Some of these initiatives include:

- Official urban planning documents as the Municipal plan and Municipal Planning Strategy, where sustainability is an important theme. These documents are developed by the Economic Department, and therefore naturally call for collaboration with the Environmental Protection Department. The first steps to introduce the DPL-Copenhagen tool to the Economic Department has been well received, and there are plans to develop this further
- Development plans for sustainable neighbourhoods: There are currently different plans for developing sustainable neighbourhoods on brownfield area (for instance Carlsberg and Nordhavnen). The Economic Department has developed its own tool for environmental assessment of suggestions for development plans of such new areas. Therefore, a connection to the DPL-Copenhagen's assessment of existing urban areas should be developed to ensure consistency between the methods and indicators selected
- Urban regeneration initiatives: Policies for urban regeneration are increasingly focusing on coordination between different initiatives, on mapping and monitoring of neighbourhoods, and on environmental sustainability. Thus, there is a potential to integrate the Copenhagen DPL-tool with these politics.
- Environmental strategies and documents, for instance the 'Eco-Metropole' (an environmental vision for Copenhagen, describing 11 distinctive environmental goals for Copenhagen in the year of 2015), the annual Green Accounting for Copenhagen (selected environmental indicators on City level), Dogme 2000 (a collaboration between Danish and Swedish municipalities on committing the municipality on measurable environmental goals) and a number of other initiatives.

In order to maintain its actuality and relevance the tools should orientate its benchmarks and indicators towards existing goals and benchmarks in municipal, national and international regulation. For instance, the DPL-tool has recently been updated: the indicator on internet access has been removed as almost all households have internet access today, and goals for recent building regulation have been included. In the DPL-Copenhagen model we have also tried to include goals from current regulation and policies on sustainability. This is however not an easy task. In the municipality of Copenhagen there are more than 240 environmental goals formulated in different planning documents, policies, sector plans etc. Naturally it is not possible to include all goals in the DPL-Copenhagen model. Moreover, for several goals formulated in sustainable policies there are no data available on district level. For instance, in the ‘Eco-Metropole’ one of the 20 goals is ‘keeping streets clean’, but the measurable goal for this is very vague, and no data on district level exists. Increasing bicycling in Copenhagen is another highly prioritised goal (the Copenhagen municipality has an ambition of becoming the leading bicycle city in the world and has formulated a bicycle policy), but there are no data for this on district level. Therefore, integrating the DPL-Copenhagen tool in the existing policies in the existing municipal policies will require an increased use of sustainability indicators and generation of data in the municipal policies and administration.

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Appendix 1: Social and economic profiles for urban districts in Copenhagen